Southern Nuclear
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Vogtle Electric Generating Plant
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February 2, 2010

Docket Nos.: 50-424 NL-10-0121

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant-Unit 1
Licensee Event Report 1-2009-003
High Main Turbine Vibration Results in a
Manual Reactor Trip of Unit 1

Ladies and Gentlemen:

In accordance with the requirements of 10CFR50.73(a)(2)(iv)(A), Southern Nuclear Operating Company (SNC) is submitting the enclosed Licensee Event Report.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

T. E. Tynan
Vice President – Vogtle

TET/TMH/sdc

Enclosure: LER 1-2009-003

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Ms. P. M. Marino, Vice President – Engineering
RType: CVC7000

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Ms. D. N. Wright, NRR Project Manager – Vogtle
Mr. M. Cain, Senior Resident Inspector – Vogtle

Enclosure
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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Vogtle Electric Generating Plant – Unit 1	05000 424	1 OF 4

4. TITLE

High Main Turbine Vibration Results in a Manual Reactor Trip of Unit 1

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
12	09	09	2009	003	0	02	02	2010	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

024

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Vogtle Electric Generating Plant/Mark Hickox, Principal Licensing Engineer	(706) 826-4129

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On December 09, 2009 at approximately 23:10 hours Eastern Standard Time (EST), during power ascension from an unplanned shutdown, with the unit operating at approximately 24 percent rated thermal power, the reactor was manually tripped. As preparations were being made to synchronize the main generator to the grid, high vibrations were experienced on the high pressure turbine. Due to the high vibrations on the turbine, the turbine was manually tripped. As the turbine was coasting down vibration levels continued to increase. Therefore condenser vacuum was broken to slow the turbine to minimize any potential damage. Prior to breaking condenser vacuum and in anticipation of the trip of the operating main feedwater pump due to low condenser vacuum, the control room operators manually tripped the reactor.

Once condenser vacuum had decreased below the main feedwater pump trip setpoint, the main feedwater pump tripped and the motor driven auxiliary feedwater (AFW) pumps automatically started. All control rods fully inserted and all safety systems responded in accordance with plant design. The plant was stabilized in Mode 3.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

A. REQUIREMENT FOR REPORT

This report is required per 10CFR50.73(a)(2)(iv)(A) due to a manual actuation of the Reactor Protection System (RPS) and an automatic actuation of the Auxiliary Feedwater (AFW) System.

B. UNIT STATUS AT TIME OF EVENT

Unit 1 was in Mode 1 (Power Operation) operating at approximately 24 percent rated thermal power, preparing to synchronize the main generator to the grid, during power ascension, following completion of an unplanned shutdown.

C. DESCRIPTION OF EVENT

On December 9, 2009 during power ascension from an unplanned shutdown the main turbine was accelerated to 1800 revolutions per minute (rpm) in preparation for synchronization to the grid. During preparations for synchronization, the main turbine vibration levels increased. Due to the elevated vibration levels on the main turbine, the operators manually tripped the main turbine from the control room in accordance with plant procedures. Once the turbine was tripped and started to coast down, vibration levels momentarily stabilized and then began to increase. Due to the increase in vibration levels on the main turbine, the operators broke condenser vacuum in accordance with plant procedures to slow the turbine to minimize any potential damage to the turbine. Prior to breaking condenser vacuum the reactor was manually tripped because operation at 24 percent power could not be sustained without the main condenser available. Without the main condenser available, the main feedwater pump would trip on low condenser vacuum and the turbine bypass valves would not be available. Therefore, the control room operators manually tripped the reactor at approximately 23:10 hours EST on December 9, 2009. Both motor driven auxiliary feedwater pumps automatically started in accordance with plant design upon trip of the main feedwater pump on low condenser vacuum. All safety systems responded per design and the plant was stabilized in Mode 3.

D. CAUSE OF EVENT

Investigation into the event determined the high vibration experienced by the turbine was as a result of a "rub" between the turbine rotor and the surrounding packing. During the spring 2008 refueling outage on Unit 1, the high pressure turbine rotor, diaphragms, and packing were replaced. The tight clearances associated with new packing introduce the opportunity for rubs and related high vibrations. A rub occurs when a stationary component contacts a rotating component while the turbine is turning. The result of rubbing is localized hot spots on the rotor's surface at the point of contact. The heat of friction developed during a rub causes the

rotor material directly under the point of contact to expand with respect to the rest of the rotor. This uneven material expansion causes thermal distortions resulting in rotor bowing. As a rotor bows, it centerline of mass and center of rotation move relative to each other resulting in changes in rotor vibration. This was found to be a common occurrence at no load or low load conditions as documented in operating experience across the industry. Less severe rubs had occurred on three of the five turbine rolls between the installation of the new equipment and this event.

E. ANALYSIS OF EVENT

Due to high vibration levels on the high pressure turbine, control room operators tripped the turbine in accordance with plant procedures. As the main turbine began to coast down, vibration levels momentarily stabilized and then started to increase. In accordance with plant procedures, the control room operators broke vacuum in the main condenser to minimize damage to the turbine. Also, prior to breaking condenser vacuum and in anticipation of the trip of the main feedwater pump due to low condenser vacuum and the resultant loss of feedwater flow, control room personnel acted appropriately to trip the reactor and prevent a challenge to the automatic reactor trip actuation circuitry. As anticipated, the main feedwater pump tripped due to low condenser vacuum which initiated the automatic start of the motor driven AFW pumps. All control rods fully inserted, and all safety systems responded in accordance with plant design. Based upon these considerations, there was no adverse affect on plant safety or the health and safety of the public.

This event does not represent a safety system functional failure.

F. CORRECTIVE ACTIONS

1. The turbine was placed on turning gear to remove the bow on the rotor. The unit was subsequently returned to service without problems.

2. Operating procedures were revised to minimize activities performed with the turbine at rated speed prior to connecting the generator to the grid thus minimizing the time at no load or low load conditions.

G. ADDITIONAL INFORMATION

1. Failed Components:
   None. Although the main turbine experienced high vibration levels, the cause of the high vibrations was due to a rub developing in the high pressure turbine. Once the turbine coasted down, it was placed on the turning gear. It was subsequently returned to service without problems.

2. Previous Similar Event:
   A review of Licensee Event Reports for the past three years did not identify a similar occurrence where a manual actuation of the RPS was required as a result of high vibrations associated with the main turbine.

3. Energy Industry Identification System Codes:
   Main Turbine System-TA
   Auxiliary Feedwater System-BA